Having thus described the preferred embodiment, the invention is now claimed to be:

1. A radiation-producing apparatus, comprising:

a) a radiation generating device;

b) a pulsed high voltage generator connected to the radiation generating device for providing electrical energy to the radiation generating device, the pulsed high voltage generator comprised of a power source and a Tesla resonant transformer, the Tesla resonant transformer having at least one capacitor, a primary coil, a secondary coil and at least a second capacitor disposed axially within the secondary coil; and,

c) a control system, the control system connected to the pulsed high voltage generator for selectively controlling the transfer of energy from the pulsed high voltage generator to the radiation generating device, the radiation-producing apparatus generating pulses of electrons and X-rays, each pulse having a time duration of about 100 nanoseconds or less.

2. The apparatus of claim 1, wherein the capacitor bank has an inductance of about 100 nanohenries or less.

3. The apparatus of claim 1, wherein the power source is a battery.

4. The apparatus of claim 3, wherein the battery has a voltage of about 50 volts or less.

5. The apparatus of claim 4, wherein the battery has a voltage of about 12 volts.

6. The apparatus of claim 1 wherein the second capacitor includes a plurality of capacitors forming a capacitor bank.

7. The apparatus of claim 6, wherein the capacitors of the capacitor bank are connected in series.

8. The apparatus of claim 1, wherein a portion of the X-rays are monoenergetic.

9. The apparatus of claim 1, wherein a portion of the X-rays have a wide energy spectrum.

10. The apparatus of claim 1, wherein the electrons in the pulse have a kinetic energy of from about 100 keV to about 1 MeV.

11. The apparatus of claim 1, wherein the radiation-producing apparatus is portable.

12. The apparatus of claim 1, wherein the radiation generating device further comprises a cathode and an anode.

13. The apparatus of claim 11, wherein said anode is selected from the group consisting of copper, a copper foil film, tantalum, tungsten and a combination thereof.

14. The apparatus of claim 1 wherein the radiation generating device includes:

an anode separated from a cathode to form a gap therebetween, the anode selected from the group consisting of copper foil, a copper foil film, tantalum, tungsten, aluminum, and a combination thereof.

15. A method of deactivating microbial contamination, comprising the steps of:

a) energizing a radiation-producing apparatus, comprised of a radiation generating device; a pulsed high voltage generator connected to the radiation generating device for providing electrical energy to the radiation generating device, the pulsed high voltage generator comprised of a power source and a Tesla resonant transformer, the Tesla resonant transformer having at least one first capacitor, a primary coil, a secondary coil and a second capacitor, the second capacitor disposed axially within the secondary coil; and, a control system, the control system connected to the pulsed high voltage generator for selectively controlling the transfer of energy from the pulsed high voltage generator to the radiation generating device, the radiation-producing apparatus generating pulses of electrons and X-rays, each pulse having a time duration of about 100 nanoseconds or less; and,

b) directing the pulses of electrons and X-rays toward the microbial contamination.

16. The method of claim 15, wherein the microbial contamination is comprised of anthrax spores.

17. A method of irradiating a material, comprising the steps of:

a) energizing a radiation-producing apparatus, comprised of a radiation generating device; a pulsed high voltage generator connected to the electron beam generating device for providing electrical energy to the radiation generating device, the pulsed high voltage generator comprised of a power source and a Tesla resonant transformer, the Tesla resonant transformer having at least one first capacitor, a primary coil, a secondary coil and a second capacitor, the second capacitor disposed axially within the secondary coil; and, a control system,

the control system connected to the pulsed high voltage generator for selectively controlling the transfer of energy from the pulsed high voltage generator to the radiation generating device, the radiation-producing apparatus generating pulses of electrons and X-rays, each pulse having a time duration of about 100 nanoseconds or less; and,

b) directing the pulse of electrons and X-rays toward the material.

18. The method of claim 17, wherein the material is a polymer.

19. A portable irradiation apparatus comprising:

an electron generator including an evacuated chamber in which electrons are generated and from which the electrons are emitted;

a Tesla transformer connected with the electron generator for boosting voltages from battery level voltages to at least 100 kV;

a battery level voltage power supply and control circuit for selectively supplying bursts of the battery level voltage to the transformer.

20. The apparatus as set forth in claim 19 wherein the battery level voltage includes voltages below 50 volts.

21. The apparatus as set forth in claim 19 wherein the Tesla transformer is connected with at least one capacitor in an LC resonant circuit relationship.

22. The apparatus as set forth in claim 21 wherein the at least one capacitor includes a plurality of capacitors mounted axially within the Tesla coil and electrically connected with the electron generator.

23. The apparatus as set forth in claim 19 further including:

a handle on which the device is supported.

24. The apparatus as set forth in claim 23 further including:

a trigger mounted adjacent the handle for manual operation.

25. The apparatus as set forth in claim 19 wherein the power supply supplies pulses of a duration in a range of 0.1 to 100 nanoseconds.

26. The apparatus as set forth in claim 25 wherein the electron generator generates electrons with a potential in a range of 100-1000 keV.

27. The apparatus as set forth in claim 19 wherein the electron generation unit includes a cathode and an anode outlet window which includes a thin layer of one of:

a layer of copper than converts at least some of the electrons into monoenergetic x-rays; and,

a tantalum or tungsten foil that converts electrons into broad energy spectrum x-rays.

28. The apparatus as set forth in claim 19 wherein the evacuated chamber includes an electron outlet window that includes a thin layer of at least one of:

aluminum,
beryllium,
copper,
tantalum,
tungsten, and
alloys thereof.

29. A method of deactivating microbes on surfaces or in thin objects, the method comprising:

generating a pulsed electron beam of 100-1000 keV;

moving a structure which generates the electron beam across the surface or thin object to deactivate the microbes.

30. The method as set forth in claim 29 further including converting at least a portion of the electrons to x-rays.

31. The method as set forth in claim 29 wherein the unit is hand-held and is manually placed adjacent a surface to be irradiated.

32. The method as set forth in claim 29 wherein the thin objects include mail.

33. The method as set forth in claim 32 wherein the surfaces include surfaces of mail handling equipment.

34. The method as set forth in claim 29 wherein the microbes include Anthrax spores.

35. The method as set forth in claim 29 wherein the structure includes a Tesla coil and capacitor circuit and further including:

boosting a DC voltage of less than 50 volts DC to an AC voltage of 1-1000 Hz;

applying the AC voltage across a cathode and an anode to generate the pulsed electron beam.

36. The method as set forth in claim 35 wherein the anode includes a thin layer of metal and further including:

converting a fraction of electrons of the electron beam into x-rays.

37. The method as set forth in claim 35 further including:

electromagnetically shielding at least one capacitor of the Tesla coil and capacitor circuit by positioning the at least one capacitor axially inside the Tesla coil.